

ABSTRACT

A semiconductor device and method of its fabrication are provided to
5 enable the device operation in a THz spectral range. The device comprises a
heterostructure including at least first and second semiconductor layers. The first
and second layers are made of materials providing a quantum mechanical coupling
between an electron quantum well (EQW) in the first layer and a hole quantum well
(HQW) in the second layer, and providing an overlap between the valence band of
10 the material of the second layer and the conduction band of the material of the first
layer. A layout of the layers is selected so as to provide a predetermined dispersion
of energy subbands in the conduction band of the first layer and the valence band of
the second layer. An application of an external bias field across the first and second
15 layers causes THz radiation originating from radiative transitions of non-
equilibrium carriers between at least one of the following: neighboring energy
subbands of the EQW, neighboring energy subbands of the HQW, and ground
energy subbands of the EQW and HQW.